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The Impact of Pharmacist Counseling on Quality of Life in Outpatients with Type 2 Diabetes Mellitus

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ABSTRACT
Type 2 Diabetes Mellitus is a chronic disease that requires long-term management and can reduce a patient's quality of life if not optimally managed. One effort that can be made to improve patient quality of life is through pharmacist counseling, which emphasizes medication education, increased therapy adherence, and the adoption of a healthy lifestyle. This study aims to determine the effect of pharmacist counseling on the quality of life of outpatients with Type 2 Diabetes Mellitus at Bhakti Kartini Hospital. This study used a quasi-experimental design with a pre-test and post-test approach. The study subjects were divided into two groups: an intervention group that received pharmacist counseling and a control group that did not receive counseling. Sampling was conducted using a purposive sampling method on 126 respondents, consisting of 63 patients in each intervention group and 63 patients in the control group. Data were obtained from medical records and routine patient visits and analyzed using SPSS version 29.0 using univariate analysis, the Shapiro-Wilk test, and the Mann-Whitney test. The results showed that outpatients with Type 2 Diabetes Mellitus at Bhakti Kartini Hospital were predominantly women aged 31–69, with a high school education, self-employment, duration of diabetes ≤ 5 years, and hypertension as the most common comorbidity. The analysis revealed a significant difference in quality of life between the control and intervention groups, indicating that pharmacist counseling plays a role in improving patients' quality of life. Furthermore, demographic factors did not significantly correlate with quality of life, suggesting that improvements in patient quality of life are more influenced by pharmacist counseling interventions and optimal therapy management.

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INTRODUCTION

Diabetes Mellitus (DM) is a non-communicable disease whose prevalence continues to increase globally and nationally. This disease is characterized by chronic metabolic disorders resulting from abnormalities in insulin secretion, insulin action, or both, resulting in hyperglycemia that can trigger various serious complications (Amalia et al., 2024). Type 2 Diabetes Mellitus is the most common type of DM and is generally associated with lifestyle factors, diet, and lack of physical activity. This condition not only impacts the patient's physical health but also psychological, social, and economic aspects, ultimately impacting their quality of life (Rammang & Reza, 2023).

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The 2018 Basic Health Research (RISKESDAS) data shows that the national prevalence of diabetes mellitus is 8.5%, or approximately 20.4 million Indonesians suffer from diabetes (MOH, 2018). Furthermore, according to data from the International Diabetes Federation (IDF), the number of diabetes sufferers worldwide in 2021 reached 537 million. This figure is predicted to continue to increase, reaching 643 million in 2030 and 783 million in 2045. According to the IDF, Indonesia ranks fifth in the world for diabetes, with 19.5 million sufferers in 2021, and this number is predicted to increase to 28.6 million in 2045 (Magliano & Boyko, 2021).

Data from the World Health Organization (WHO) estimates that the number of people with diabetes mellitus in Indonesia will increase from 8.4 million in 2000 to 21.3 million in 2030. The majority of cases of diabetes mellitus (DM) are type 2 diabetes mellitus (T2DM), which occurs when an unhealthy lifestyle (too many calories, too little exercise, and obesity) occurs (Lorber, 2014). The prevalence of diabetes in Indonesia is 10.6%, ranking fifth with 19.47 million people, after the United States, Pakistan, India, and China (Soelistijo et al., 2021).

Data from the Bekasi Health Office in 2021 shows that the prevalence of diabetes mellitus in West Java province has increased from 1.3% to 1.7%. Based on data from the 2020 Bekasi City Health Profile, the estimated number of DM sufferers in Bekasi City is 44,714, spread across all sub-districts. The sub-district with the highest number of DM sufferers is East Bekasi District (11,246 cases), followed by North Bekasi District (7,985 cases), and Pondok Gede District (7,254 cases). Jati Sampurna District has the lowest number of Type 2 DM sufferers (1,377 cases). Based on the aforementioned data, diabetes mellitus (DM) requires appropriate, integrated, and continuous management to ensure proper blood glucose control and optimal patient quality of life (Laxmi et al., 2021; Hakim et al., 2022).

In DM, blood sugar can be controlled through lifestyle changes and oral hypoglycemic drug/insulin therapy. This is supported by research findings that suggest blood glucose levels can be controlled through diet, dietary changes, and a healthy lifestyle. Furthermore, research shows that oral hypoglycemic drugs, such as metformin and DPP-IV inhibitors, can effectively lower HbA1c levels and improve glycemic control, whether used alone or in combination with other medications (Komalasari et al., 2024). The effectiveness of these drug combinations suggests that their use can be tailored to individual patient needs, improving adherence and treatment outcomes (Mohammad et al., 2019). Insulin therapy is indicated if the optimal dose of oral hypoglycemic agents does not improve blood glucose levels and HbA1c > 9% with metabolic decompensation (Soelistijo et al., 2021).

A common challenge in clinical practice when providing pharmacist counseling for chronic diseases, including type 2 diabetes mellitus (DM), is poor patient adherence to treatment, leading to poor glycemic control and an increased risk of long-term complications. Factors influencing this non-adherence include a lack of understanding of the disease and treatment, concerns about medication side effects, and minimal support from healthcare professionals. This non-adherence can negatively impact clinical outcomes, such as increased HbA1c levels, the risk of macrovascular and microvascular complications, and a reduced quality of life.

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Pharmacists, as healthcare professionals, play a crucial role in improving medication adherence in DM patients. Pharmacists are not only responsible for dispensing medication but also act as counselors, educating patients about diabetes management, including the importance of adhering to medication schedules, understanding the correct use of insulin, and regularly monitoring blood sugar. According to Fatiha and Sabiti (2021), their research findings indicate that pharmacist counseling significantly improves medication adherence in type 2 DM patients, with a pill count of 62.80% compliance and 37.14% non-adherence (11).

Studies show that pharmacist interventions can significantly improve medication adherence and lower HbA1c levels in diabetes patients (Presley et al., 2019). Pharmacists also play a role in improving overall health outcomes through a comprehensive pharmaceutical intervention approach (Machado et al., 2007). Furthermore, according to Simon et al. (2021), the group receiving therapy sessions accompanied by pharmacist education demonstrated better patient HbA1c levels within the normal range (4.5-6%). This demonstrates the efficacy of pharmacist interventions. This supports the important role of pharmacists in providing education and counseling to help improve medication adherence and quality of life in diabetes mellitus patients (Diantari et al., 2019). Patient medication adherence is a key indicator of treatment success, preventing complications, and medication adherence can impact better blood sugar control, a lower risk of hospitalization, lower morbidity and mortality, and lower healthcare costs (Simon et al., 2021).

In controlling clinical outcomes in patients with diabetes mellitus, pharmacists play a role in therapy management and education. Research shows that pharmacist involvement in the healthcare team can significantly improve glycemic control, lower HbA1c, and reduce the risk of cardiovascular complications in patients with diabetes (Machado et al., 2007). Pharmacist interventions have also been shown to play a role in improving patient quality of life and improving clinical outcomes, including reducing diabetes-related hospitalizations (Polgreen et al., 2015). Furthermore, a study by Morgado et al. (2011) showed that a pharmacist intervention program involving ongoing patient education and monitoring can significantly improve glycemic control and reduce HbA1c levels (Morgado et al., 2011).

Based on observational data at Bhakti Kartini Hospital, diabetes mellitus is one of the most common diseases with visits. The number of visits to Bhakti Kartini Hospital from May 2024 to August 2024 was 922. There are no regular interventions (counseling) to monitor the treatment of Type 2 DM patients. In this regard, pharmacist counseling plays a crucial role in improving patient adherence to therapy. Pharmacists, with their expertise in pharmacotherapy, can provide education on the correct use of medications, explain the importance of adherence to therapy, and help patients manage potential side effects.

Based on the aforementioned problem analysis, the author is interested in conducting research at Bhakti Kartini Hospital to assess the impact of pharmacist counseling on adherence, clinical outcomes, and quality of life in Type 2 DM patients. Furthermore, the aim of this study is to more comprehensively evaluate the impact of pharmacist counseling on medication adherence, clinical outcomes, and quality of life in outpatients with Type 2 DM at Bhakti Kartini Hospital. This research is expected to provide a deeper understanding of the importance of pharmacist counseling in the management of chronic diseases such as Type 2

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DM, as well as provide scientific evidence for the development of more integrated healthcare services.

METHOD

This quasi-experimental study, with a prospective pre-test and post-test design, evaluated the effect of pharmacist counseling on the quality of life of patients with type 2 diabetes mellitus (DM). The study design involved two groups: an intervention group that received pharmacist counseling and a control group that did not receive such counseling. The sampling technique used a non-probability sampling method with a purposive sampling approach. This method was chosen because sample selection was based on certain considerations and criteria established by the researchers, such as a diagnosis of type 2 DM, treatment status, and completeness of medical records. The independent variable in this study was pharmacist counseling for patients with type 2 DM. The dependent variable was the quality of life of outpatients with type 2 DM at Bhakti Kartini Hospital.

The population in this study was all outpatients with type 2 DM at Bhakti Kartini Hospital. For illustration, the population of patients diagnosed with type 2 DM who were outpatients during a three-month period in 2024 was 922. The sample size used in this study was calculated based on the sample size estimation formula for research aimed at testing the hypothesis of a difference in the proportions of two independent groups (Sastroasmoro & Ismael, 2014). From the calculation results, the sample used for each group, namely the intervention group that received counseling, amounted to 63 respondents and the control group amounted to 63 respondents, so that the total sample required in this study was 126 respondents. In this study, data collection was carried out retrospectively and prospectively from medical records and visits of Type 2 DM patients who routinely come for check-ups at the hospital every month. After the data was collected, statistical analysis and data processing were carried out using the SPSS (Statistical Product and Service Solutions) Statistics program version 29.0 which included univariate analysis, the Shapiro-Wilk test, the Mann-Whitney test, and correlation analysis of the relationship between counseling and quality of life in Type 2 DM patients.

RESULT AND DISCUSSION

Sociodemographic Characteristics

Characteristics in the study based on gender, age, education, occupation, duration of illness, and comorbidities.

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Table 1, Sociodemographic Characteristics of Type 2 DM Patients

Karakteristik Pasien	Diabetes Melitus Tipe 2				Sig (P-Value)
	Kelompok Kontrol		Kelompok Intervensi		
	(n = 51)	%	(n = 50)	%	
Jenis Kelamin					
Laki-laki	20	39.22	14	28.00	**0.741**
Perempuan	31	60.78	36	72.00	
Usia					
19-30	0	0.00	1	2.00	**0.626**
31-59	23	45.10	27	54.00	
60-69	28	54.90	19	38.00	
70-79	0	0.00	3	6.00	
Pendidikan					
SD	3	5.88	1	2.00	**0.997**
SMP	1	1.96	0	0.00	
SMA	43	84.31	44	88.00	
D3	1	1.96	1	2.00	
S1	3	5.88	4	8.00	
Pekerjaan					
Tidak Bekerja	0	0.00	0	0.00	**0.421**
IRT	16	31.37	22	44.00	
Karyawan Swasta	6	11.76	9	18.00	
PNS	1	1.96	2	4.00	
Wiraswasta	22	43.14	16	32.00	
Pedagang	4	7.84	0	0.00	
Petani	2	3.92	1	2.00	
Durasi Sakit					
≤ 5 tahun	29	56.86	37	74.00	**0.573**
> 5 tahun	22	43.14	13	26.00	
Penyakit Penyerta					
Tidak Ada	5	9.80	15	30.00	**0.690**
Hipertensi	24	47.06	19	38.00	
Stoke	1	1.96	0	0.00	
TBC	1	1.96	1	2.00	
Hypercholesterol	1	1.96	1	2.00	
CKD & HT	8	15.69	4	8.00	
CHF & HT	4	7.84	5	10.00	
CAD & HT	7	13.73	5	10.00	

Based on Table 1, the characteristics of patients with Type 2 DM compare the control group (n = 51) and the intervention group (n = 50) in terms of gender, age, education, occupation, duration of illness, and comorbidities. In terms of gender, both groups were predominantly female (60.78% in the control group and 72.00% in the intervention group). Statistical tests showed no significant difference between the two groups (P > 0.05).

Age characteristics showed that the majority of patients were aged 60-69 years in both groups: 54.90% in the control group and 38.00% in the intervention group. In terms of education, the majority of patients in both groups had a high school education (84.31% in the control group and 88.00% in the intervention group). Statistical tests also showed no significant difference. In terms of occupation, the predominant occupation was self-employed (43.14% in the control group and 32.00% in the intervention group), followed by housewives in the intervention group (44.00%).

Regarding illness duration, patients with illness duration ≤ 5 years were more common in both groups, namely 56.86% in the control group and 74.00% in the intervention group. In terms of comorbidities, hypertension was the most common comorbidity in both groups (47.06% in the control group and 38.00% in the intervention group). No significant

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differences were found in any characteristic variables between the control and intervention groups, with a P value > 0.05 for each category. This indicates a relatively balanced distribution of characteristics between the two groups before treatment.

Differences in Quality of Life of Type 2 DM Patients in the Control and Intervention Groups

This study also aimed to assess whether there were differences in quality of life between the control and intervention groups. Before analyzing the data, normality and homogeneity tests were performed to determine which statistical test to use. Because the number of patients in both groups was greater than 30, the Shapiro-Wilk statistical test was used to test the data for normality using SPSS 29. The Shapiro-Wilk test yielded a significance level of <0.05, indicating that the data were not normally distributed. Therefore, to determine the differences in quality of life scores of Type 2 DM patients in the control and intervention groups, a nonparametric Mann-Whitney statistical test was used.

Table 2 . Results of the Test of Differences in Quality of Life of Type 2 DM Patients in the Control and Intervention Groups

Variabel		Kelompok		*Sig*
		Kontrol	Intervensi	
Selisih Rata-rata (Kualitas Hidup)	Selisih 1 (*Post-test* 1 - *Pre-test*)	-1.74	-0.15	0.040
	Selisih 2 (*Post-test* 2 - *Post-test* 1)	2.06	-0.07	0.019
	Selisih 3 (*Post-test* 3 - *Post-test* 2)	-3.08	-1.09	0.084

Based on Table V.16, based on the results of the statistical test in the table, it can be seen that there is a significant difference in changes in quality of life between the control and intervention groups in Difference 1 (p = 0.040) and Difference 2 (p = 0.019), where the intervention group showed better changes than the control group. In Difference 3, although the intervention group still showed better results, the difference was not statistically significant (p = 0.084). This indicates that the intervention had a significant effect in improving quality of life in the initial stage, but the effect appeared to decrease or become insignificant in the subsequent stages. Thus, this intervention is effective in improving quality of life in the initial phase, although the impact is not consistent across all stages.s

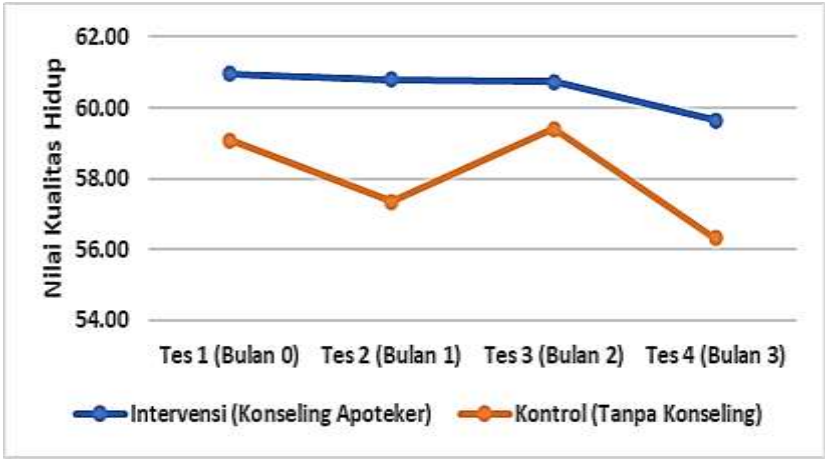

Figure 1 Graph of the profile of the average quality of life values between the control group and the intervention group.

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Based on Figure V.5, there is a difference in the trend of quality of life scores between the intervention group (pharmacist counseling) and the control group (no counseling) across the four measurements. In the intervention group, quality of life scores tended to be stable from Test 1 (pre-test) to Test 4 (post-test 3), with a smaller decrease seen between Test 3 and Test 4. In contrast, the control group showed greater fluctuations, starting with a significant decrease from Test 1 to Test 2, followed by an increase in Test 3, and then again decreasing significantly in Test 4. This reflects that the intervention group (counseling) had better stability than the control group in maintaining quality of life.

The relationship between patient quality of life variables and confounding factors in the intervention group.

This study also aims to identify factors influencing the effectiveness of pharmacist counseling in improving quality of life in patients with type 2 diabetes. The effectiveness of pharmacist counseling is not solely determined by the intervention itself but is also influenced by various additional factors that may impact the desired outcome. Therefore, it is important to understand the role of these factors in the context of patient management so that the approach used can be tailored and optimized.

Several variables that could potentially be confounding factors in this study include gender, age, education level, occupation, disease duration, and the presence of comorbidities. These factors can influence patient quality of life scores, requiring comprehensive analysis. The influence of these confounding factors can be analyzed using the Spearman's rho correlation test to more deeply assess the relationship between variables.

Tabel 3 . The relationship of patient quality of life & confounding factors in the intervention group

No	*Confounding Faktor*	Kualitas Hidup
1	Jenis Kelamin	0.957
2	Usia	0.756
3	Pendidikan	0.356
4	Pekerjaan	0.458
5	Durasi Sakit	0.496
6	Penyakit Penyerta	0.903

The Spearman's rho correlation test was used to analyze the relationship between confounding factors and the measured variable, namely the quality of life of patients with Type 2 DM. Based on this test criteria, if the significance value (Sig) is less than 0.05, the confounding factor is considered to have a significant relationship with the studied variable. Conversely, if the Sig value is greater than 0.05, there is no significant relationship between the confounding factor and the measured variable.

Based on the analysis results in the intervention group, the relationship between several confounding factors and the quality of life of patients with Type 2 DM indicated that there was no statistically significant relationship between respondent characteristics and patient quality of life. This is indicated by the p-value for all confounding factor variables being greater than 0.05.

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The gender factor showed a p-value of 0.957, indicating that gender differences did not significantly influence the quality of life of patients in the intervention group. This indicates that both male and female patients had relatively similar perceptions of quality of life after receiving pharmacist counseling intervention.

The age variable also showed no significant relationship with quality of life (p = 0.756). This result indicates that differences in patient age range were not a determining factor in quality of life in the intervention group, likely due to the pharmacist's counseling ability to improve understanding and management of the disease equally across age groups.

Regarding education level, a p value of 0.356 was obtained, indicating no significant relationship between education level and patient quality of life. This indicates that the pharmacist counseling provided was able to bridge differences in patient education levels by conveying easy-to-understand information.

Furthermore, employment was also not significantly related to patient quality of life (p = 0.458). This result indicates that patient employment status did not significantly impact quality of life after the intervention, likely because pharmacist counseling helped patients manage their therapy without being affected by daily work activities.

The duration of illness variable showed a p value of 0.496, indicating that the duration of Type 2 Diabetes Mellitus was not significantly related to quality of life in patients in the intervention group. This may indicate that pharmacist counseling interventions play a role in improving patient adaptation to their illness, both in patients with relatively short and long-term illnesses.

Furthermore, comorbidities also showed no significant association with patient quality of life (p = 0.903). This indicates that even with comorbidities, quality of life can still be maintained through comprehensive pharmacist counseling.

Overall, these results indicate that the quality of life of patients in the intervention group was not affected by the confounding factors studied, and therefore, the improvement in quality of life is more likely attributed to the pharmacist counseling intervention.

The profile of antidiabetic medications prescribed for Type 2 DM is as follows:

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Table 4 Table of Combination of Type 2 DM Drugs Given

No	Nama Obat DM yang diberikan
1	Metformin 500 mg + Acarbose 100 mg + Lantus Solostar
2	Metformin 500 mg + Novorapid Flexpen + Lantus Solostar
3	Metformin 500 mg + Acarbose 100 mg + Lantus Solostar + Fonilyn MR 60 mg
4	Metformin 500 mg + Novorapid Flexpen
5	Metformin 500 mg + Ryzodeg Flexpen
6	Acarbose 100 mg + Lantus Solostar+ Novorapid
7	Metformin 500 mg + Gliquidone 30 mg + Lantus Solostar
8	Glimepirid 4 mg + Novorapid Flexpen + Lantus Solostar
9	Glimepirid 4 mg + Novorapid Flexpen + Pioglitazone 30 mg
10	Glimepirid 3 mg + Acarbose 100 mg + Ryzodeg Flexpen
11	Glimepirid 4 mg + Metformin 500 mg + Acabose 100 mg + Lantus Solostar
12	Metformin 500 mg + Glimepirid 1 mg + Lantus Solostar
13	Lantus Solostar + Metformin 500 mg + Novorapid + Sitagliptin 100 mg
14	Lantus Solostar + Metformin 500 mg + Acarbose 50 mg
15	Glimepirid 3 mg + Acarbose 100 mg + Ryzodeg Flexpen + Sitaglipton 100 mg
16	Glimepirid 2 mg + Novorapid Flexpen + Lantus Solostar
17	Glimepirid 1 mg + Metformin 500 mg + Novorapid Flexpen + Lantus Solostar
18	Glimepirid 2 mg + Novorapid Flexpen + Lantus Solostar + Metformin 500 mg
19	Metformin 500 mg + Acarbose 100 mg + Lantus Solostar + Novorapid
20	Sitagliptin 100 mg + Acarbose 100 mg + Ryzodeg Flexpen
21	Glimepirid 4 mg + Metformin 500 mg + Lantus Solostar
22	Glimepirid 1 mg + Metformin 500 mg + Novorapid Flexpen

1. The majority of patients with type 2 diabetes use a combination of oral antidiabetic agents and insulin, primarily basal and basal-prandial insulin.
2. Metformin is the most predominant oral antidiabetic agent, consistent with treatment guidelines.
3. Lantus and Novorapid are the most frequently used insulins, indicating the need for tight glucose control.
4. The presence of complex combinations indicates that many patients are in the intensification phase of therapy.
5. The Ryzodeg regimen represents a more practical alternative to premixed insulin in certain groups.

CONCLUSION

Based on the results of the research conducted, it can be concluded that outpatients with Type 2 Diabetes Mellitus at Bhakti Kartini Hospital who participated in this study were predominantly female, aged 31–69 years. The majority of respondents had a high school education, with the majority working as self-employed. Clinically, most patients had had Diabetes Mellitus for less than 5 years, and the most common comorbidity was hypertension. The analysis of group differences between the control and intervention groups showed significant differences in the quality of life variables of outpatients with Type 2 Diabetes Mellitus at Bhakti Kartini Hospital. These findings indicate that the intervention, particularly pharmacist counseling, played a role in improving patients' quality of life compared to the group that did not receive the intervention. Furthermore, the analysis showed that demographic factors such as gender, age, education level, occupation, disease duration, and comorbidities were not significantly associated with the quality of life of patients with Type 2

Diabetes Mellitus. This suggests that differences in demographic characteristics are not the primary determinant of patient quality of life, but rather are influenced by other aspects, such as pharmacist counseling interventions and optimal therapy management. Based on the research results, discussion, and conclusions, several recommendations can be put forward. For further research, it is recommended to develop more structured pharmacist counseling, involve a larger sample size with a longer follow-up period, and use quality of life instruments more specific to Type 2 Diabetes Mellitus to obtain more comprehensive results. In this study, data on outpatients with Type 2 Diabetes Mellitus were obtained from a single hospital. Future research could utilize data from multiple hospitals to further compare each research variable, tailoring it to the patient characteristics of each hospital.

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